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BARATARIA BAY WATERWAY, LOUISIANA

LETTER

FROM

THE SECRETARY OF THE ARMY

TRANSMITTING

A LETTER FROM THE CHIEF OF ENGINEERS, DEPARTMENT OF THE ARMY, DATED OCTOBER 19, 1956, SUBMITTING A REPORT, TOGETHER WITH ACCOMPANYING PAPERS AND ILLUSTRATIONS, ON A REVIEW OF REPORTS ON AND PRELIMINARY EXAMINATION AND SURVEY OF BARATARIA BAY WATERWAY, LOUISIANA, REQUESTED BY RESOLUTION OF THE COMMITTEE ON RIVERS AND HARBORS, HOUSE OF REPRESENTATIVES, ADOPTED SEPTEMBER 25, 1945, AND AUTHORIZED BY THE FLOOD CONTROL ACT AND THE RIVER AND HARBOR ACT APPROVED DECEMBER 22, 1944, AND MARCH 2, 1945, RESPECTIVELY



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LIST OF APPENDIXES MADE IN CONNECTION WITH THE REPORT OF THE DISTRICT ENGINEER

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- Appendix A—Benefits from improvement of Barataria Bay Waterway, La., only, to 12 feet by 125 feet.
- Appendix B—First cost and annual charges.
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LETTER OF TRANSMITTAL

DEPARTMENT OF THE ARMY,
Washington, D. C., January 16, 1957.

THE SPEAKER OF THE HOUSE OF REPRESENTATIVES.

DEAR MR. SPEAKER: I am transmitting herewith a favorable report dated October 19, 1956, from the Chief of Engineers, Department of the Army, together with accompanying papers and illustrations, on a review of reports on and preliminary examination and survey of Barataria Bay Waterway, La., requested by resolution of the Committee on Rivers and Harbors, House of Representatives, adopted September 25, 1945, and authorized by the Flood Control Act and the River and Harbor Act approved December 22, 1944, and March 2, 1945, respectively.

In accordance with section 1 of Public Law 14, 79th Congress, and Public Law 732, 79th Congress, the views of the State of Louisiana are set forth in the enclosed communication, together with the views of the Department of the Interior in accordance with Public Law 732, 79th Congress. The reply of the Chief of Engineers to the Secretary of the Interior is also enclosed.

Although the Bureau of the Budget advises that there is no objection to the submission of the report to the Congress, it states that no commitment can be made at this time as to when any estimate of appropriation would be submitted for construction of the project, if authorized by the Congress, since this would be governed by the President's budgetary objectives as determined by the then prevailing fiscal situation. A copy of the letter from the Bureau of the Budget is enclosed.

Sincerely yours,

WILBER M. BRUCKER,
Secretary of the Army.

COMMENTS OF THE BUREAU OF THE BUDGET

EXECUTIVE OFFICE OF THE PRESIDENT,
BUREAU OF THE BUDGET,
Washington, D. C., January 9, 1957.

THE HONORABLE THE SECRETARY OF THE ARMY.

MY DEAR MR. SECRETARY: Assistant Secretary Roderick's letter of January 8, 1957, transmits the proposed report of the Acting Chief of Engineers on a review of reports on and preliminary examination and survey of Barataria Bay Waterway, La., requested by a resolution of the House Rivers and Harbors Committee adopted September 25, 1945, and authorized by the acts of December 22, 1944, and March 2, 1945.

The Acting Chief of Engineers recommends, subject to certain stipulated conditions of local cooperation, modification of the existing project for the Barataria Bay Waterway, to provide a channel 12 feet deep and 125 feet wide from the Intracoastal Waterway to Grand Isle, La., following the present route to Bayou St. Denis, thence by a new channel along the western shore of Barataria Bay and through Barataria Pass to the 12-foot contour in the Gulf of Mexico, with an extension of the project to include a channel of the same dimensions in Bayou Rigaud extending from Barataria Pass westerly along the north side of Grand Isle for a distance of about 3.2 miles.

Based on March 1956 price levels, the total Federal first cost is estimated at \$1,697,000, including \$50,000 for navigation aids. The total non-Federal first cost for meeting the stipulated conditions of local cooperation is estimated at \$242,000. Annual carrying charges are estimated at \$153,000, annual benefits at \$617,000, and the benefit-cost ratio is stated to be 4.0.

I am authorized by the Director of the Bureau of the Budget to advise you that there would be no objection to the submission of the report to the Congress. No commitment, however, can be made at this time as to when any estimate of appropriation would be submitted for construction of the project, if authorized by the Congress, since this would be governed by the President's budgetary objectives as determined by the then prevailing fiscal situation.

Sincerely yours,

CARL H. SCHWARTZ, Jr.,
Chief, Resources and Civil Works Division.

COMMENTS OF THE STATE OF LOUISIANA

STATE OF LOUISIANA,
DEPARTMENT OF PUBLIC WORKS,
Baton Rouge, September 10, 1956.

Maj. Gen. CHARLES G. HOLLE,
*Acting Chief of Engineers, Department of the Army,
Office of the Chief of Engineers, Washington 25, D. C.*

DEAR GENERAL HOLLE: Reference is made to your letter of August 21, 1956, submitting a survey report entitled Survey of Barataria Bay Waterway, La., to the State of Louisiana for comment through the Department of Public Works.

The Department of Public Works has reviewed this report and concurs with the recommendations made therein. The Barataria Waterway project is one of the most urgently needed projects in the State of Louisiana and its construction will result in great benefits to the area which it serves. The oil developments offshore in southwest Louisiana together with increased industrial development of this area combine to make this project pay big dividends.

The Department of Public Works wishes to express its appreciation to the Corps of Engineers for the splendid report which they prepared on this project which has resulted in its authorization. All of the people in the area to be served by the project are in favor and are anxious to see the channel completed.

Yours very truly,

LORRIS M. WIMBERLY, *Director.*

COMMENTS OF THE DEPARTMENT OF THE INTERIOR

DEPARTMENT OF THE INTERIOR,
OFFICE OF THE SECRETARY,
Washington, D. C., October 3, 1956.

Maj. Gen. E. C. ITSCHNER,
*Chief of Engineers, Department of the Army,
Washington 25, D. C.*

DEAR GENERAL ITSCHNER: This is in reply to the letter dated August 21 from the Acting Chief of Engineers transmitting to this Department for comment your proposed report, together with the reports of the Board of Engineers for Rivers and Harbors, and of the district and division engineers, on a review of reports on and preliminary examination and survey of Barataria Bay Waterway, La.

Your report recommends modification of the existing project for the Barataria Bay Waterway, La., to provide a channel 12 feet deep and 125 feet wide from the Intracoastal Waterway to Grand Isle, La., following the present route to Bayou St. Denis, thence by a new channel along the western shore of Barataria Bay and through Barataria Pass, to the 12-foot contour in the Gulf of Mexico, with an extension of the project to include a channel of the same dimensions in Bayou Rigaud extending from Barataria Pass westerly along the north side of Grand Isle for a distance of about 3.2 miles, at an estimated cost to the United States of \$1,647,000 for construction.

The Fish and Wildlife Service advises that deleterious effects of the project as related to fresh and brackish marsh areas would be adequately minimized by performance of the work in the manner described in paragraphs 60, 63, and 114b of the district engineer's report. Need for water-control structures in the dikes, if excessive ponding occurs, should receive attention when postproject conditions have been determined.

The Service notes paragraph 62 of the district engineer's report which reads as follows:

All oyster beds in the area are planted beds which are on the bottoms of natural waterways over which navigation has the paramount right. However, selection of the route can be made with the view to avoiding as many beds as possible. Inasmuch as these are planted beds, those in the direct route can be transplanted to other locations.

The Service feels that the natural resources of the State of Louisiana seem to be treated rather lightly. Oyster beds were planted at an expense to the State and local interests to maintain a resource much in demand and were not in conflict with other uses of natural waters at the time of their establishment. The cost of transplanting of the oyster beds and the loss of annual production from the areas destroyed should be assigned to the project. A firm estimate of monetary losses has not been made. However, the magnitude of the loss can be realized as past production records indicate that from \$25,000 to \$50,000 worth of oysters are taken from these beds each year and it is safe to assume that if practical to transplant these beds, the cost would be \$250,000 or more.

Paragraph 114 of the district engineer's report discusses the changes in drainage and salinities that will be brought about by the project and concludes that losses to fish and wildlife resources will be negligible. The Fish and Wildlife Service cannot concur in these conclusions as there is no assurance that the changes, though apparently minor, will

not cause serious changes in the environment of the organisms adjusted to existing conditions. These forms have a narrow range of tolerance and very limited ability to adjust to new conditions. While the project is not exactly the same as any previous works in this area, there are many similarities to other waterways constructed in the gulf coastal area. Severe losses have resulted to oysters in those areas and there is no assurance that it won't happen here. Very minor changes in salinities and existing water currents have far-reaching influences on oyster production as well as other aquatic forms. These changes cannot be accurately predicted and the only position that the Service can take is to consider these resources in jeopardy.

Means of mitigating losses are not readily recognizable in this area. Little exact information is available as to the changes that will take place and the adequacy of corrective measures. The Service does agree that work performed by bucket dredge in interior areas will minimize siltation effects on certain oyster beds. However, no apparent benefit to salt-water intrusion and fresh-water reduction will result from this type of performance.

As the project develops further, the Fish and Wildlife Service stands ready to consult with the construction agency and the Louisiana Wild Life and Fisheries Commission in devising means of reducing losses to the natural resources of the area. The Service recommends that prior to initiation of dredging operations the construction agency work out in detail with the Louisiana Wild Life and Fisheries Commission the most satisfactory means of spoil deposition and consult with the Commission from time to time throughout the course of dredging operations.

The Geological Survey notes that map coverage is available for the entire waterway as follows:

1. Topographic quadrangles (15-minute size), Barataria (1949) and Fort Livingston (1945).
2. Planimetric quadrangles (7½-minute size), Bay Dogris (1935) and Bay Tambour (1935).

No mention was made in the report regarding the use of these maps.

The Survey further notes that dredging operations involved in the relocation of the waterway to the western edge of Barataria Bay and necessary deepening might permit additional salt water intrusion, but it is expected that such additional intrusion would not be significant in the effects on local water supplies.

We appreciate the opportunity of commenting on your report.

Sincerely yours,

FRED G. AANDAHL,
Assistant Secretary of the Interior.

LETTER TO THE SECRETARY OF THE INTERIOR

DEPARTMENT OF THE ARMY,
OFFICE OF THE CHIEF OF ENGINEERS,
Washington, D. C., January 4, 1957.

The Honorable the SECRETARY OF THE INTERIOR.

DEAR MR. SECRETARY: This is in response to the letter from the Assistant Secretary of the Interior of October 3, 1956, commenting on the proposed report on the Barataria Bay Waterway, La.

Reference is made to the statement that the cost of transplanting the oyster beds and the loss of annual production from the areas destroyed by construction of the proposed Barataria Bay Waterway should be assigned to the project. The losses to existing oyster beds resulting from construction of the proposed improvement would be less than the losses to oyster beds which would be caused by maintaining the presently authorized waterway in the bay. Consequently, these losses would have no adverse effect on the economic justification of the improvement.

Your comments concerning the effects of the proposed improvement on the oyster resource due to changes in drainage and salinities in the bay have been carefully considered. Changes in the regimen of the bay caused by the improvement would be extremely minor and consequently would not adversely affect the oyster resource to any significant extent. However, if you desire to make any recommendations concerning measures which you feel should be taken to mitigate possible losses to the natural resources of the bay, I shall be pleased to call your recommendations to the attention of the Public Works Committees of Congress at any hearing which might be held in connection with this project.

Sincerely yours,

E. C. ITSCHNER,
Major General, USA,
Chief of Engineers.

BARATARIA BAY WATERWAY, LA.

REPORT OF THE CHIEF OF ENGINEERS

DEPARTMENT OF THE ARMY,
OFFICE OF THE CHIEF OF ENGINEERS,
Washington 25, D. C., October 19, 1956.

Subject: Barataria Bay Waterway, La.

To: The Secretary of the Army.

1. I submit herewith for transmission to Congress the report of the Board of Engineers for Rivers and Harbors in response to resolution of the Committee on Rivers and Harbors of the House of Representatives, adopted September 25, 1945, requesting the Board to review the reports on Bayou Rigaud, La., submitted on March 6, 1936, with a view to determining if any modification of the recommendation contained therein is advisable at the present time. It is also in partial response to the authority contained in the Flood Control Act, approved December 22, 1944, for preliminary examinations and surveys for flood control, rice irrigation, navigation, pollution, salt-water intrusion, and drainage on all streams and bayous * * * in Louisiana lying between the East Atchafalaya Basin protection levee and the Mississippi River * * *; and to the authorities contained in the River and Harbor Act, approved March 2, 1945, for preliminary examinations and surveys for Barataria Bay and connecting channels, Louisiana, to provide a continuous waterway from the Gulf of Mexico to the Intracoastal Waterway; and for flood control, irrigation, navigation, and drainage, and for the prevention of stream pollution and salt-water intrusion, on all streams and bayous * * * in Louisiana lying between the East Atchafalaya Basin protection levee and the Mississippi River; * * *. Other reports in response to the authorizations in the acts of 1944 and 1945 will be submitted later.

2. After full consideration of the reports secured from the district and division engineers, the Board recommends modification of the existing project for the Barataria Bay Waterway, La., to provide a channel 12 feet deep and 125 feet wide from the Intracoastal Waterway to Grand Isle, La., following the present route to Bayou St. Denis, thence by a new channel along the western shore of Barataria Bay and through Barataria Pass, to the 12-foot contour in the Gulf of Mexico, with an extension of the project to include a channel of the same dimensions in Bayou Rigaud extending from Barataria Pass westerly along the north side of Grand Isle for a distance of about 3.2 miles; generally in accordance with the plan of the district engineer and with such modifications thereof as in the discretion of the Chief of Engineers may be advisable; at an estimated cost to the United States of \$1,647,000 for construction and \$80,000 for annual maintenance, provided local interests agree to (a) furnish without cost to the United

States all lands, easements, rights-of-way, and spoil-disposal areas necessary for construction of the project and for subsequent maintenance, when and as required; (b) accomplish and maintain without cost to the United States all alterations to pipelines, cables, and any other facilities necessary for the construction of the project; and (c) hold and save the United States free from damages resulting from construction and maintenance of the project.

3. After due consideration of these reports, I concur in the views and recommendations of the Board.

CHAS. G. HOLLE,
Major General, United States Army,
Acting Chief of Engineers.

REPORT OF THE BOARD OF ENGINEERS FOR RIVERS AND HARBORS

CORPS OF ENGINEERS, UNITED STATES ARMY,
BOARD OF ENGINEERS FOR RIVERS AND HARBORS,
Washington 25, D. C., August 8, 1956.

Subject: Barataria Bay Waterway, La.

To: The Chief of Engineers, Department of the Army.

1. This report is submitted in response to the following resolution adopted September 25, 1945:

Resolved by the Committee on Rivers and Harbors of the House of Representatives, United States, That the Board of Engineers for Rivers and Harbors be, and is hereby, requested to review the reports on Bayou Rigaud, Louisiana, submitted on March 6, 1936, with a view to determining if any modification of the recommendation contained therein is advisable at the present time.

It is also in partial response to the authority contained in the Flood Control Act, approved December 22, 1944, for preliminary examinations and surveys for flood control, rice irrigation, navigation, pollution, salt-water intrusion, and drainage on all streams and bayous * * * in Louisiana lying between the East Atchafalaya Basin protection levee and the Mississippi River * * *; and to the authorities contained in the River and Harbor Act, approved March 2, 1945, for preliminary examinations and surveys for Barataria Bay and connecting channels, Louisiana, to provide a continuous waterway from the Gulf of Mexico to the Intracoastal Waterway; and for flood control, irrigation, navigation, and drainage, and for the prevention of stream pollution and salt-water intrusion, on all streams and bayous * * * in Louisiana lying between the East Atchafalaya Basin protection levee and the Mississippi River; * * *. Other reports in response to the authorizations in the acts of 1944 and 1945 will be submitted later.

2. Barataria Bay Waterway, in southeastern Louisiana, extends in a southerly direction from the junction of the Gulf Intracoastal Waterway and Bayou Barataria 37 miles to the east end of Grand Isle where it enters the Gulf of Mexico through Barataria Pass. Bayou Rigaud parallels the shoreline of the gulf for 5 miles on the north side of Grand Isle and connects with Barataria Bay Waterway at the inside of Barataria Pass. All the bayous and bays comprising the waterway are tidal with the normal range of tides being about 6 inches. The present Federal project provides for a channel 5 feet deep with a bottom width of 50 feet from Bayou Villars to Grand Isle. Local interests in 1947 dredged a channel through the offshore bar of

Barataria Pass 12 feet deep and 200 feet wide. They also dredged a channel of the same depth and width of 125 feet from Barataria Pass to a dock on Bayou Rigaud 0.6 mile west of its mouth, and a channel 8 feet deep and 100 feet wide from that dock to a camp location 1.6 miles distant. Others have dredged numerous canals and channels in nearby areas.

3. Population in the tributary area is sparse with the heaviest concentration along the waterway being on Grand Isle which has about 1,200 permanent residents. The area adjacent to the upper 6 miles of the waterway is developed for residential and commercial purposes. South of this reach the waterway traverses marshland where all transportation is by water. These marshlands are used by trappers, and the bays and bayous contribute to the support of the local seafood industry. Petroleum exploration and drilling operations are presently active in the area. In recent years 10 active oil and gas fields have been established and 383 producing wells completed. Offshore drilling operations are also in progress in the Grand Isle leasing area in the Gulf of Mexico. Sulfur is mined in substantial quantities near Barataria Bay. Traffic on the Barataria Bay Waterway has increased from 127,000 tons in 1944 to 695,000 tons in 1954. The principal item of commerce is crude oil. Vessel traffic on the waterway totaled 15,361 trips in 1954, of which all but 120 were by vessels with drafts of 6 feet or less. The district engineer estimates that 61,000 tons are now being moved over Bayou Rigaud in 9,627 trips made by vessels with drafts up to 10 feet.

4. Local interests desire that the Barataria Bay Waterway be enlarged, particularly through Dupre Cutoff, to provide a channel 12 feet deep over a bottom width of 125 feet; and that Bayou Rigaud be likewise enlarged for the entire length of Grand Isle. Request for the improved channel was based on the inadequacy of the present channel to serve the increased traffic, principally barge tows, and the ever-increasing size, number, and drafts of fishing vessels.

5. The district engineer finds that the most suitable plan of improvement for the Barataria Bay Waterway and Bayou Rigaud is to provide channels in these waterways 12 feet deep and 125 feet wide. The waterway would extend from the Intracoastal Waterway along the existing route of the Barataria Bay Waterway to mile 15.5 in Bayou St. Denis, thence through a new channel on the west side of Barataria Bay to the existing channel about 0.6 mile northwest of Barataria Bay Lighthouse. From this point the existing channel will be followed through Barataria Pass to the 12-foot contour in the gulf, and a spur channel will be dredged in Bayou Rigaud from Barataria Pass for a distance of about 3.2 miles. The district engineer estimates the total first cost at \$1,939,000, including \$242,000 to be borne by local interests for rights-of-way, spoil-disposal areas, and readjustment of pipelines and submarine cables. The Federal first cost, including \$50,000 for navigation aids, would be \$1,697,000. The total annual carrying charges would be \$153,000, including \$80,000 for maintenance dredging, and \$4,000 for maintenance of navigation aids. Annual benefits are estimated at \$617,000 consisting of \$610,000 for savings in transportation and operating costs to the petroleum, sulfur, and fishing industries; \$5,000 for harbor of refuge benefits; and \$2,000 for savings in maintenance of the existing project. The benefit-cost ratio is 4. The district engineer recommends his plan as outlined

above, at an estimated Federal first cost of \$1,647,000 for construction and an annual cost of \$80,000 for maintenance, subject to certain conditions of local cooperation. The division engineer concurs.

6. Local interests were notified of the recommendations of the reporting officers and given an opportunity to present additional information to the Board. Careful consideration has been given to the communications received.

VIEWS AND RECOMMENDATIONS OF THE BOARD OF ENGINEERS FOR RIVERS AND HARBORS

7. The Board of Engineers for Rivers and Harbors concurs with the views and recommendations of the reporting officers. The channel dimensions authorized for the existing project for Barataria Bay Waterway are inadequate for the present and reasonably prospective future navigation. The proposed modification is suitable and economically justified.

8. Therefore, the Board recommends modification of the existing project for the Barataria Bay Waterway, La., to provide a channel 12 feet deep and 125 feet wide from the Intracoastal Waterway to Grand Isle, La., following the present route to Bayou St. Denis, thence by a new channel along the western shore of Barataria Bay through Barataria Pass, to the 12-foot contour in the Gulf of Mexico, with an extension of the project to include a channel of the same dimensions in Bayou Rigaud extending from Barataria Pass westerly along the north side of Grand Isle for a distance of about 3.2 miles; generally in accordance with the plan of the district engineer and with such modifications thereof as in the discretion of the Chief of Engineers may be advisable; at an estimated cost to the United States of \$1,647,000 for construction and \$80,000 for annual maintenance, provided local interests agree to (a) furnish without cost to the United States all lands, easements, rights-of-way, and spoil-disposal areas necessary for construction of the project and for subsequent maintenance, when and as required; (b) accomplish and maintain without cost to the United States all alterations to pipelines, cables, and any other facilities necessary for the construction of the project; and (c) hold and save the United States free from damages resulting from construction and maintenance of the project.

For the Board:

E. C. ITSCHNER,
Major General, United States Army,
Chairman.

REPORT OF THE DISTRICT ENGINEER

SYLLABUS

The Barataria Bay Waterway is used by vessels engaged in the movement of crude oil, supplies, and equipment for the drilling of offshore and inshore oil wells; in the shrimping and oyster fisheries; and in pleasure fishing and yachting.

The shallow depths and narrow bottom widths preclude the use of marine equipment of economical size and full cargo capacity of barges now being used, as well as causing delays to vessels negotiating the project.

The most practical plan for improvement of the waterway and for meeting the desires of local interests is to provide a 12 by 125-foot channel, with relocation of a portion of the project to the western side of Barataria Bay to provide water

free from wave action; and extension of the project to the 12-foot contour in the the Gulf of Mexico, as well as modification to include dredging of 3.2 miles of Bayou Rigaud at its eastern end.

The Federal first cost of the revised project is estimated at \$1,697,000, and the Federal annual charges are estimated at \$144,000. The total annual benefits are estimated at \$617,000. The total benefit to total cost ratio of 4.0 to 1 indicates the plan is justified.

CORPS OF ENGINEERS, UNITED STATES ARMY,
OFFICE OF THE DISTRICT ENGINEER,
NEW ORLEANS DISTRICT,
New Orleans 9, La., March 16, 1956.

Subject: Survey of Barataria Bay Waterway, La.

Through: The Division Engineer, Lower Mississippi Valley Division,
Corps of Engineers, Vicksburg, Miss.

To: The Chief of Engineers, Department of the Army, Washington
25, D. C. Attention: ENGWD.

1. *Authority.*—This report is submitted in partial response to the following authorizations:

(a) Flood Control Act approved December 22, 1944 (Public Law 534, 78th Cong., 2d sess.):

SEC. 11. The Secretary of War is hereby authorized and directed to cause preliminary examinations and surveys for flood control and allied purposes * * * to be made * * * which include the following named localities * * *:

For flood control, rice irrigation, navigation, pollution, salt water intrusion, and drainage * * *; on all streams and bayous in Louisiana lying between the East Atchafalaya Basin protection levee and the Mississippi River * * *.

(b) River and Harbor Act approved March 2, 1945 (Public Law 14, 79th Cong., 1st sess.):

SEC. 6. The Secretary of War is hereby authorized and directed to cause preliminary examinations and surveys to be made at the following-named localities * * *:

* * * * *
For flood control, irrigation, navigation, and drainage and for the prevention of stream pollution and salt water intrusion * * * on all streams and bayous in Louisiana lying between the East Atchafalaya Basin protection levee and the Mississippi River; * * *

and in response to the following authorizations:

(c) River and Harbor Act approved March 2, 1945 (Public Law 14, 79th Cong., 1st sess.):

SEC. 6. The Secretary of War is hereby authorized and directed to cause preliminary examinations and surveys to be made at the following named localities * * *:

Barataria Bay and connecting channels, Louisiana, to provide a continuous waterway from the Gulf of Mexico to the Intracoastal Waterway.

(d) Resolution adopted September 25, 1945:

Resolved by the Committee on Rivers and Harbors of the House of Representatives, United States, That the Board of Engineers for Rivers and Harbors be and is hereby requested to review the reports on Bayou Rigaud, Louisiana, submitted on 6 March 1936, with a view to determining if any modification of the recommendations contained therein is advisable at the present time.

(e) Assignment of the examination to the division engineer, lower Mississippi Valley division, by letter from the Chief of Engineers dated March 9, 1945, CE-SPEWR (assignment of examinations, River and Harbor Act approved March 2, 1945); and to the district

engineer, New Orleans district, by letter from the division engineer, Lower Mississippi Valley division, dated December 4, 1945, LMVEE (assignment of examinations, River and Harbor Act approved March 2, 1945). These assignments also covered the River and Harbor Act of December 22, 1944. The review of reports on Bayou Rigaud, La., was assigned to the division engineer, lower Mississippi Valley division, by fifth endorsement from the Chief of Engineers dated April 29, 1946, file CE-SPEWR (Review of Reports on Bayou Rigaud, La.), and to the district engineer, New Orleans district, by sixth endorsement from the division engineer, lower Mississippi Valley division, dated May 6, 1946, file LMVD 800.92 (Rigaud Bayou, La.) LMVGR.

(f) A report of preliminary examination dated October 29, 1948, in response to the above authorizations was reviewed by the Board of Engineers for Rivers and Harbors and the survey authorized by the Chief of Engineers May 18, 1949.

2. *Scope of survey.*—The survey comprised fathometer surveys, review of past surveys on the existing project, and studies of hydrographic data on the existing and proposed waterways. The economic survey included a study of the shrimping, oyster, trapping, towing, and oil exploration and drilling industries. General study included visual reconnaissance of the existing waterway and of the proposed relocation where readily accessible; study of maps, charts, and prior reports on the waterway. The following agencies and interested parties were consulted relative to the proposed improvement:

- (a) Louisiana Department of Public Works.
- (b) Louisiana Department of Conservation, Minerals Division.
- (c) The Texas Co.
- (d) Humble Oil & Refining Co.
- (e) Seafood industries.
- (f) United States Fish and Wildlife Service.
- (g) Louisiana Department of Wild Life and Fisheries.
- (h) Jefferson Parish Police Jury.
- (i) The California Co.
- (j) J. Ray McDermott Co.
- (k) W. Horace Williams Co.
- (l) A. G. Thomas Co.
- (m) United States Coast Guard, Eighth District.
- (n) Towing companies.
- (o) American Waterway Operators, Inc.

The official views of the United States Department of the Interior, Fish and Wildlife Service, are contained in appendix D. The Louisiana Department of Public Works was among the original sponsors of the improvement and is in favor of the project. The official view of the Louisiana Wild Life and Fisheries Commission are included in appendix E. The official views of the United States Coast Guard, Eighth District, are contained in appendix C.

3. *Description.*—The Barataria Bay Waterway extends in a general southerly direction for a distance of about 37 miles. The origin of this waterway is at the junction of the Gulf Intracoastal Waterway and Bayou Barataria near Lafitte Post Office. From its origin it extends southerly through Bayou Barataria, Bayou Dupont, a land cut (known as Dupre Cutoff) through marsh area, Bayou Cutler, Bayou St. Denis, and Barataria Bay to the east end of Bayou Rigaud.

At its southerly terminus it also connects with Barataria Pass, and through that pass with the Gulf of Mexico.

4. Reference is made to United States Coast and Geodetic Survey Charts Nos. 1050, 1116, and 1273; United States Geological Survey Quadrangles Barataria, Bay Dogris, Wilkinson Bay, and Barataria Pass; and to plates 1, 2, and 3, appended.

5. The section of Bayou Barataria from mile 37.1 to mile 36.7 at Bayou Villars has a minimum surface width of 200 feet at mean low sea level and a controlling depth of 9 feet over a bottom width of 125 feet. Bayou Barataria, mile 36.7 to mile 30.6, has a minimum surface width of 350 feet, and a controlling depth of 13 feet over a bottom width of 100 feet. Bayou Dupont, mile 30.6 to mile 29.0, has a minimum surface width of approximately 150 feet and a controlling depth of 7 feet over a bottom of 20 to 30 feet. Dupre Cutoff, mile 29.0 to mile 20.8, has a minimum surface width of approximately 110 feet and a controlling depth of 5 feet over a bottom width of 30 feet. Bayou Cutler, mile 20.8 to mile 17.5, has a surface width of about 300 feet and a controlling depth of 5 feet over a bottom width of 100 feet. Bayou St. Denis, which the existing waterway uses for about 3.7 miles, has a surface width of 1,600 feet and a controlling depth of 8 feet over a bottom width of 500 feet. Barataria Bay from Bayou St. Denis to the entrance to Barataria Pass at Grand Isle, a distance of 12 miles, has a controlling depth of 4.5 feet and is approximately 10 miles wide. Barataria Pass has a maximum depth of more than 100 feet at mean low sea level, and a controlling depth of about 12 feet (August 1954) over the bar into the Gulf of Mexico.

6. Bayou Rigaud is a tidal waterway extending along the north shore of Grand Isle, La., for a distance of about 5 miles. Bayou Rigaud connects Caminada Bay and Barataria Bay. The bayou has a minimum width of approximately 350 feet. Bayou Rigaud, at its eastern end, has been improved for 0.6 mile by local interests to provide a depth of 12 feet over a 125-foot bottom width, and to an 8-by 100-foot channel between mile 0.6 and mile 2.2. In the remaining 2.7 miles which is unimproved a controlling depth of 2 feet below mean low water exists.

7. All of the bayous and bays comprising the Barataria Bay Waterway are tidal. Normal and extreme ranges of ordinary tides are 6 and 30 inches, respectively. In the coastal area hurricanes have driven gulf waters over the marshlands to an elevation of over 6 feet above mean low sea level. The frequency of hurricanes on this coastal area is about one in 7 years. The generally accepted hurricane season in this section is from the middle of August through the first week in October. During the fall and winter months prolonged winds from the northerly sectors have depressed the water surface as much as 3 feet below mean low sea level.

8. *Tributary area.*—Natural ridges extend along both banks of Bayou Barataria. From mile 37.1 to mile 30.6 along the Barataria Bay Waterway these ridges are utilized for highway, residential, and commercial purposes. South of Lafitte Village the waterway traverses marshland and all transportation is by water.

9. The area south of Lafitte Village is inhabited only by trappers, fishermen, and personnel employed in oilfields.

10. The marshlands support an extensive trapping industry, while

the inland bays and bayous contribute heavily to an extensive seafood industry.

11. Grand Isle lies at the southerly terminus of the waterway. This island is low and sandy in character (about 7.5 miles long and a mile wide at the center), having a population of 1,190 permanent residents (1950 census). An improved, hard-surfaced highway connects Grand Isle with U. S. Highway No. 90 at Raceland. The inhabitants are engaged principally in fishing, processing of seafoods, oil exploration and production, and commercial activities catering to recreationists. Grand Isle, offering surf bathing and deep-sea fishing, is visited by thousands during the spring, summer, and early fall months. From April through September about 1,500 tourists are on the island.

12. Bayou Rigaud bounds the northern shore of Grand Isle and separates it from Fifi Island, on which a village known as Fisher's Settlement is located. This settlement is composed of 60 to 75 persons, all engaged in the seafood industry. Bayou Rigaud serves principally as a supply point for vessels engaged in commercial fishing, and oil activities, but is also used by all vessels visiting Grand Isle.

13. At Grand Ecaille, about 12 miles northeast of Grand Isle, sulfur is mined in substantial quantities. The Freeport Sulphur Co. Canal, from Grand Ecaille to Port Sulphur (on the Mississippi River) provides waterway transportation to the Mississippi River where this commodity is reloaded over the levee into barges for shipment to New Orleans, the north, east, and west. Ships are also loaded at Port Sulphur for coastal and foreign destinations.

14. Extensive petroleum exploration and drilling operations are in progress in the coastal region and in the Gulf of Mexico, both east and west of Grand Isle. In recent years 10 active inshore oil and gas fields have been established in this locality and 383 producing wells completed. Oil companies have State leases amounting to over 425,000 acres in the Grand Isle leasing area in the Gulf of Mexico. To date the Humble Oil & Refining Co. has 28 drilling platforms in the Grand Isle area, and other companies are preparing to begin major operations in the area. Crude oil pipelines which transport this product out of the area are shown on plate 2.

15. *Bridges.*—Only one bridge, a steel highway swing bridge, (owned by the State of Louisiana Department of Highways) crosses the Barataria Bay Waterway at about mile 36.0. Horizontal clearance provided is 60.0 feet, while the vertical clearance is 10.5 feet above mean low sea level and 7.0 feet above extreme high water. Construction of this highway bridge was in accordance with plans approved by the Chief of Engineers and the Secretary of War on May 21, 1946.

16. *Prior reports.*—Prior reports are as follows:

Date	Character	Recommendation of reporting officer	Chief of Engineers	Published
Aug. 17, 1881	Survey			A. R. 1881, p. 1307.
Oct. 18, 1915	Preliminary examination.	Favorable.	Favorable	H. Doc. 200, 65th Cong., 1st sess.
Mar. 1, 1917	Survey	do.	do.	H. Doc. 200, 65th Cong., 1st sess.
Dec. 7, 1935 ¹	Preliminary examination.	Unfavorable.	Unfavorable.	Not published.
Oct. 29, 1948	do.	Favorable for survey.		Do.

¹ Bayou Rigaud, La., only.

17. *Existing Corps of Engineers' project.*—The existing project was adopted by the River and Harbor Act of March 2, 1919, House Document No. 200, 65th Congress, 1st session. This project calls for a channel 5 feet in depth below mean low sea level over a bottom width of 50 feet from Bayou Villars to Grand Isle, a distance of 37 miles. The existing project was completed in 1925 at a cost of \$73,037.11. Total maintenance cost to June 30, 1954, has been \$47,550.83, making the total expenditure \$120,587.97. The last maintenance expenditure was \$800.54 in 1950 for channel patrol. The latest (1950) approved estimate for annual maintenance is \$5,000.

18. *Local cooperation on existing and prior projects.*—Prior to the adoption of the existing project no improvements of any nature were undertaken on this waterway by the United States. Under the present project local interests were required to furnish to the United States, without cost, all rights-of-way and spoil-disposal areas required. All conditions have been complied with by local interests.

19. *Other improvements.*—In January 1947 the Humble Oil & Refining Co. spent \$75,000 dredging a 12- by 200-foot channel 7,200 feet in length across the offshore bar of Barataria Pass to the 12-foot contour in the Gulf of Mexico; a 12- by 125-foot channel from Barataria Pass to a dock on Bayou Rigaud 0.6 mile west of its mouth, and an 8- by 100-foot channel from that dock to a camp location, a distance of 1.6 miles. Approximately \$1,500,000 was spent by this company in constructing storage tanks, wharf facilities, office, and living quarters on Bayou Rigaud.

20. The hurricane of September 3, 1948, shoaled 2,800 feet of the offshore channel to a depth of 9 feet. This shoal was removed in October 1948 at a cost of \$35,000. The cost of this dredging was \$1 a cubic yard because of the high mobilization charges and small yardage involved. The storm of September 4, 1949, caused no silting of this channel. A fathometer survey made in June 1954 showed the controlling depth to be 10 feet. The channel was redredged in August 1954 at a cost of \$100,000.

21. In 1951–52 the Department of Highways, State of Louisiana, constructed 14 creosoted timber groins along the gulf shore of Grand Isle to combat beach erosion. The cost of these groins was \$480,000.

22. The groins were not effective in stabilizing the beach except at the extreme western end of the island. In 1954 the Department of Public Works, State of Louisiana, replenished the eroded beach area with material dredged from Bayou Rigaud on the north side of the island. As this excavation was not continuous it did not improve navigation of the bayou. The replacement of material has not been completed, but at this time 813,000 cubic yards have been placed along the beach.

23. Sulfur and oil interests in conjunction with the Department of Public Works, State of Louisiana, and the police jury of Jefferson Parish, are planning to dredge Bayou Dupont and Dupre Cutoff to a depth of 9 feet over a 100-foot bottom width. This is the most restricted reach of the existing project and at the present time the possibility of local interests doing this work at their expense seems assured.

24. Oil companies have dredged numerous canals and channels to oil well locations in the area.

25. *Terminal and transfer facilities.*—Along Bayou Barataria, between mile 37.1 and mile 30.6 of the Barataria Bay Waterway,

there are numerous privately owned wharves ranging in size from 2 by 12 feet to 20 by 80 feet and backfilled bulkheads up to 300 feet long which afford mooring facilities of about 4,300 feet. Six of these privately owned facilities are available to all boats without charge for landing and purchasing gasoline, oil, and supplies. At Grand Isle, 3 privately owned wharves having a total of about 2,500 feet of wharfage are available to all boats without charge for landing and purchasing gasoline, oil, and supplies, and a recently completed slip provides mooring facilities for over 100 boats. Oil companies have also constructed, for their own use, 517 feet of wharfage, and 3 slips with boat pens for mooring their smaller craft. The shrimping industry has constructed a total of 810 feet of wharfage in Bayou Rigaud at Grand Isle together with a slip for the mooring of fishing vessels. While the wharves constructed by the shrimping industry are for the primary purpose of handling fishing vessels these facilities are made available to the public when not being utilized by shrimping vessels. On Dupre Cutoff, about 7 miles below Lafitte, the Texas Co. has constructed an extensive terminal for loading of gasoline produced at the Lafitte oilfield and for the handling of oilfield equipment and supplies. Repair facilities and marine ways are available in the Barataria-Lafitte section and at Grand Isle. Hard surfaced highways connect the Barataria-Lafitte section and Grand Isle with main arteries of travel. No railroads traverse the area. Along the ridges adjacent to Bayou Barataria adequate sites are available for the development of terminals which may be needed in the future. The north side of Grand Isle along Bayou Rigaud also offers numerous sites for further development of wharf and terminal facilities.

26. *Improvement desired.*—In order to determine the definite desires of local interests a public hearing was held on August 2, 1949, at Westwego. Forty persons attended the hearing. The attendance was composed of engineers, surveyors, fishermen, towing operators, boatmen, and representatives of State and parish organizations and oil companies. The unanimous wishes of those present was that the Barataria Bay Waterway be enlarged, particularly through Dupre Cutoff; and that Bayou Rigaud be likewise enlarged for the entire length of Grand Isle. All arguments in favor of enlargement of the existing project to a 12 by 125-foot project were based on the increased traffic, principally barge tows, and to the ever-increasing size, number, and drafts of fishing (shrimping) vessels. Barge traffic in this area was virtually unknown when the project was initially constructed.

27. *Commerce.*—Since 1919 the method of reporting commerce under the title "Barataria Bay" has been changed twice. From 1919 to 1929 in reporting commercial statistics, Barataria Bay was considered to extend from Harvey lock to the Gulf of Mexico at Grand Isle, a distance of 52 miles. The first 15 miles of this route was also the route of the Intracoastal Waterway, and carried a considerable amount of east-west traffic which did not traverse the present Barataria Bay Waterway. In 1929, through east-west traffic was eliminated from the commercial statistics; however, local traffic to and from Harvey lock was retained. All traffic above Bayou Villars not actually creditable to the project was eliminated in 1936 and transferred to the Intracoastal Waterway.

28. Traffic on the Barataria Bay Waterway as given in the annual report of the Chief of Engineers is as follows:

Year	Tons	Year	Tons
1944.....	127, 280	1950.....	461, 299
1945.....	189, 402	1951.....	374, 850
1946.....	245, 461	1952.....	422, 484
1947.....	308, 507	1953.....	519, 782
1948.....	270, 376	1954.....	694, 696
1949.....	545, 249		

NOTE.—Details of traffic by commodities for the years 1919-54 are given in table 1.

29. The principal item of tonnage, as seen from table 1, is crude oil. Prior to 1937 this tonnage contained (as did all tonnages shown) Intracoastal Waterway movements. From 1937 to and through 1954 crude-oil shipments reached a peak in 1954 and dropped to its lowest point in 1944. This decrease was due to diversion of crude oil from the Barataria oilfield to pipeline transportation in 1943. The years 1945-54 show an increase in crude-oil movements due to the development of new oilfields in the area.

30. Pipelines are not competitive with barge transportation in the early stages of development of oil fields. Only when the proven reserves and production of an oilfield becomes sufficiently great does the pipeline become competitive with waterway transportation. The cheaper the waterway transportation the greater must be the reserves and production to warrant the installation of a pipeline.

31. Even with reserves and production available, independent operators usually prefer waterway transportation because it is more flexible than a pipeline in shifting from one point to another in order to meet changes in demand.

32. One other factor to consider in the amount of crude oil which will be attracted to a pipeline is whether or not the pipeline is a common carrier. Most independent oil producers and some major companies are not incorporated as common pipeline companies, and lines laid by them would handle only their own oil.

33. With the large potential inshore and offshore areas in the vicinity of the Barataria Bay Waterway, coupled with the undeveloped oilfields, there will exist at all times a sizable amount of crude oil which will be dependent on waterway transportation.

TABLE 1.—Commerce, in tons

Year	Total	Shrimp, oysters, shellfish	Shells	Lumber	Piling	Cement	Crude oil	Petroleum products	Iron and steel	Ice	Drilling mud	Water	Miscellaneous
1919	195,360	9,317		1,200				11,922		19,179			153,742
1920	168,238	7,648		108				10,381		1,565			148,536
1921	206,770	9,619		142				25,238		3,305			168,466
1922	170,596	11,498		787				56,228		6,525			95,558
1923	151,558	13,535						28,174		7,000			102,849
1924	112,306	26,798		168		66		3,061		6,217			75,996
1925	142,795	14,259	650	460		58		30,929		7,586			92,247
1926	117,419	23,324		1,718				23,740		6,337			69,466
1927	90,331	23,324		772				22,452		7,637			45,646
1928	105,388	14,093		224				50,590		2,565			37,316
1929	340,784	27,590	283	181,229			7,878	87,009		(1)			41,940
1930	193,578	27,590	2,000	1,402		81	62,193	59,271		(1)			35,604
1931	56,339	21,143						1,499		3,100			23,554
1932	97,822	11,911		518		60		4,064		6,773			20,265
1933	93,176	14,841	759	2,093	13,834	1,859	9,675	9,560	81	12,505			38,024
1934	159,052	18,541	874	2,093	1,211	36	41,706	23,343	2,520	4,054			12,969
1935	88,253	14,565	7,470	660	12,612	692	76,497	11,627	3,453	1,350			13,319
1936	198,882	21,341	34,753	1,658	7,993		1,431	4,006	1,251	1,488			3,434
1937	267,546	13,553	40,434	1,294	1,132	750	75,087	7,901	4,004	2,273			8,585
1938	224,807	10,947	(1)	462	1,700	900	52,236	19,514	3,884	(1)			3,961
1939	321,591	9,437	8,900	873	2,587	1,398	97,892	10,774	3,889	(1)			3,064
1940	377,796	10,106	10,027	1,306	2,587	1,506	196,711	8,840	3,889	(1)			1,756
1941	317,634	9,333	12,219	256	996	1,390	176,057	4,312	1,825	(1)			1,567
1942	227,888	8,433	9,571	114	61	304	142,401	6,363	1,047	(1)			1,651
1943	127,280	7,038	12,641	565	660	1,857	19,591	8,538	2,880	(1)			3,277
1944	189,402	7,896	400	206	824	1,523	31,510	8,183	4,206	(1)			5,207
1945	245,461	12,944		185	310	1,152	58,814	12,454	6,850	(1)			7,633
1946	308,507	9,128		7,478	4,276	1,088	78,547	13,648	8,342	5,962			11,898
1947	270,376	13,559	41,648	3,255	2,514	2,288	122,978	45,069	7,481	7,290			26,310
1948	545,249	26,418	42,587	3,255	3,687	4,700	186,047	48,078	10,000	1,500			57,371
1949	461,269	16,418	30,061	4,886	9,778	3,538	189,667	34,864	21,444	9,114			95,535
1950	374,580	3,022	3,022	4,900	18,245	3,030	179,177	19,117	19,493	7,679			35,994
1951	422,484	9,320	30,914	6,029	10,072	671	174,685	24,558	24,740	12,479			23,213
1952	519,782	52,656	52,656	9,100	2,348	2,248	271,734	30,980	18,561	11,810			19,729
1953	694,695	28,497	27,036	11,576	8,925	2,302	320,267	39,185	28,278	1,017			31,845
1954													42,962

! No record.
: Estimated.

NOTES

Years 1919-36, inclusive, show traffic on Harvey Canal, Bayou Barataria, Bayou Dupont, Dupre Cut, Bayou Cutler, and Barataria Bay—52 miles.
Years 1937-47 show traffic on Bayou Barataria from Bayou Villars to and through Bayou Dupont, Dupre Cut, Bayou Cutler, and Barataria Bay—37 miles.
Vegetable products, textiles, machinery, chemicals, and other traffic no longer of consequence such as rafted logs, crossties, etc., have been placed in the miscellaneous column.

Years 1919-30 include through traffic on the Intracoastal Waterway between Bayou Villars and Harvey over Bayou Barataria and Harvey Canal.

34. The origin and destination of crude oil moving over the Barataria Bay Waterway at the present time is as follows:

Origin	Year discovered	Daily allowable in barrels	Amount shipped over project	Destination
			<i>Average barrels per day</i>	
Lake Hermitage field.....	1934	453	453	Avondale, La.
Lake Washington field.....	1931	7,016	2,116	Avondale and Amesville, La.
Manila Village field.....	1949	133	133	Avondale and Westwego, La.

The yearly production of oilfields in the area is shown in table 2.

TABLE 2.—Crude-oil production in Barataria area (barrels)

Field	1946	1947	1948	1949	1950	1951	1952	1953	1954	1955
Barataria.....	1,502,571	1,346,361	1,629,022	1,790,494	1,949,118	1,861,141	1,606,372	1,271,352	876,903	725,799
Bay de Chene.....	72,904	92,818	274,795	368,787	818,913	1,290,425	1,288,673	1,301,855	1,205,001	1,456,895
Grand Isle (blocks 16 and 18) 1.....			20,530	146,374	308,591	467,381	483,139	1,385,304	736,660	1,394,356
Lafitte.....		4,359,651	4,099,370	4,017,171	4,331,490	4,490,626	4,468,711	4,648,724	3,686,420	3,321,832
Lake Hermitage.....	4,376,810		7,233	4,916	16,073	18,866	44,057	53,805	58,018	196,563
Lake Washington.....	7,050	9,100				365,992	430,870	971,974	1,943,900	4,725,353
Manila Village.....	178,554	190,348	144,234	150,160	175,901	96,920	83,262	61,185	32,257	19,606
Queen Bess Island.....				43,532	84,605					11,121
South Barataria.....	5,315	4,815	1,429	32,707	35,317	10,726	2,221	8,166		19,981
West Barataria.....		7,441	26,962	1,642,963	1,465,859	1,418,681	1,261,277	1,070,040	727,435	587,885

1 Offshore field.

35. Prior to 1948 fresh water was a major item of tonnage, however, in 1948 the Humble Oil & Refining Co. (drilling offshore in the Gulf of Mexico) found that salt water from the gulf could be used for drilling purposes, and that by the addition of chemicals to control the salinity, accurate electrical logs, essential for securing information as to formations could still be taken. With the elimination of fresh water for drilling purposes the only water now handled by that company is for potable uses and the tonnage has decreased. This water originates from Harvey and is destined to drilling platforms in the Gulf of Mexico. Water is also towed from Harvey to Lafitte and the other inland fields in the area. Increased oil operations in 1954 resulted in a significant increase in fresh water tonnage.

36. Shells (clam) are the next important item of commerce. These originate from supply yards at Harvey and move to Grand Isle for use in road construction and repair. Due to the lapse of several years following initial construction before extensive road repair and reconstruction is undertaken this item naturally fluctuates in amount.

37. Gasoline tonnage, which is taken to Marrero, La., is composed almost entirely of production from the Lafitte Field.

38. Oysters and shrimp do not constitute a major portion of the tonnage carried over the waterway. However, they do account for a considerable number of vessel movements annually. Oysters are transported from the beds in Barataria Bay and connecting waterways to points along the waterway in the vicinity of Lafitte and Barataria, as well as to New Orleans for either processing or delivery to the raw oyster trade. Seed oysters from the natural reefs lying to the east of the Mississippi River are also transported over the waterway for planting on the oyster beds in Barataria Bay and connecting waters. Shrimp are transported from the harvesting grounds in Barataria Bay and the Gulf of Mexico to Lafitte, Barataria, Westwego, Harvey and New Orleans for either processing or for delivery to the fresh market outlets. Ice handled over the waterway is utilized in the preservation of the shrimp catch.

39. The remainder of the tonnage over the waterway is composed of oilfield supplies for the oil drilling and operations taking place in the area. Indications are that this tonnage will materially increase during the life of the project, particularly because of the major operations in the Gulf of Mexico which can be expected during the life of the project, and because of continued development of existing oil fields in the area.

40. Tonnage figures are not available for Bayou Rigaud. It is estimated that 61,000 tons are now being moved over the bayou. This tonnage is estimated to consist of 10,000 tons of shrimp and oysters; 3,000 tons of clamshells; 2,000 tons of lumber; 1,000 tons of piling; 1,000 tons of cement; 2,000 tons of petroleum products; 5,000 tons of iron and steel; 1,000 tons of ice; 3,000 tons of drilling mud; 25,000 tons of water; and 8,000 tons of miscellaneous materials.

41. There is a growing tendency to use Bayou Rigaud as a supply base for offshore oil operations. Vessels for use in offshore work must be licensed for such service, and are consequently more seaworthy and have higher operational costs than vessels on inland waterways. Supplies and equipment are being carried to bases on Grand Isle for transfer to vessels licensed for Gulf operations. Expansion of Grand Isle as a center of offshore operations can be expected as it is

the closest point to the Gulf of Mexico having highway transportation and electrical power, as well as having some of the highest land in the area.

42. Extensive shrimp- and oyster-processing plants are also located along Bayou Rigaud.

43. Traffic on Bayou Rigaud will continue to increase during the life of the project, with the largest increase being caused by accelerated oil operations in the Gulf of Mexico, and a smaller increase due to expansion of commercial fishing activities.

44. *Vessel traffic.*—In 1954, the latest year of record, the Barataria Bay Waterway traffic was as follows:

Draft (feet)	Upbound			Downbound		
	Motor vessels	Barges	Total	Motor vessels	Barges	Total
9	7	3	10	15	1	16
8	16	227	243	12		12
7	89	52	141	91	1	92
6	2,497	137	2,634	915	598	1,513
5	2,695	230	2,925	2,400	374	2,774
4	3,836	189	4,025	1,867	526	2,393
3	2,168	126	2,294	4,063	150	4,213
2	1,369	994	2,363	797	669	1,466
1	92	715	807	2,542	340	2,882
Total	12,769	2,673	15,442	12,702	2,659	15,361
Total net registered tonnage	157,185	588,255	745,440	156,349	585,174	741,523

45. When the individual trips of these vessels are studied it is found that the floating equipment drawing in excess of 6 feet has used only a small portion of the waterway. Bayou Barataria between mile 37.1 and mile 30.6 has sufficient depth to accommodate drafts in excess of 6 feet, as has the southern extremity of the waterway which was dredged by private interests to a depth of 12 feet.

46. Trips and drafts of vessels, while as complete as possible, do not show trips made by individually owned boats based in the Barataria, Lafitte, Manila Village, and Grand Isle areas.

47. Those vessels traversing Dupre Cutoff must of necessity be limited in draft to less than 6 feet, while in Barataria Bay drafts are limited by the 4.5-foot controlling depth. In cases where it is necessary to move drilling equipment and dredges through such shoal portions the movement can only be accomplished by the use of sufficient number of small tugs to drag the tow across the area. Towboats and barges must be as small as possible in order to navigate the channel comprising the project. Towing vessels are usually held to 5 feet draft and barges to 450 tons or less, loaded to a maximum draft of 4.5 feet in winter and 5.0 feet in summer.

48. A total of 588 shrimp trawlers licensed by the State of Louisiana operated from ports served by the waterway. These shrimp trawlers are from 16 to 52 feet in length and have drafts of from 2 to 5 feet.

49. Barataria and Lafitte serve as the home ports of a number of pleasure boats. During the spring, summer, and fall months an additional number of pleasure craft visit Grand Isle for the deep-sea fishing available at that point. Sizes and drafts of yachts based at Lafitte and Barataria range from 20 feet to 65 feet and have drafts from 1.5 feet to 4.5 feet.

50. The improved reach of Bayou Rigaud, about 0.6 mile of the easterly end, is navigated by vessels of 10-foot draft, and from mile 0.6 to mile 2.2 by vessels of up to 8-foot draft. The unimproved reach (2.7 miles) cannot be navigated except by craft of very shallow draft, making its use by local craft and itinerant shrimping boats of over 3.5-foot draft impossible.

51. No record of vessel traffic on Bayou Rigaud is available. The estimated vessel traffic over this bayou at the present time is as follows:

Draft (feet)	Inbound			Outbound		
	Motor vessels	Barges	Total	Motor vessels	Barges	Total
10.....	12	-----	12	12	-----	12
9.....	100	40	140	100	40	140
8.....	325	10	335	325	10	335
7.....	1,000	15	1,015	1,000	15	1,015
6.....	1,500	5	1,505	1,500	5	1,505
5.....	2,000	50	2,050	2,000	50	2,050
4.....	2,500	15	2,515	2,500	15	2,515
3.....	1,200	5	1,205	1,200	5	1,205
2.....	500	100	600	500	100	600
1.....	250	20	270	250	20	270
Total.....	9,387	240	9,627	9,387	240	9,627

52. *Difficulties attending navigation.*—The most restricted reach on the existing project is Dupre Cutoff which has a controlling depth of 5 feet over a central bottom width of 30 feet. Even though the project were maintained to the full 5 by 50-foot dimensions, traffic would find navigation of the cutoff expensive and particularly hazardous in passing other tows or large single vessels. Even with vessels of 4.5-foot drafts a considerable amount of danger, delay, and expense is incurred by passing tows because of the narrow bottom width available. The narrowest barges (26 feet) which it is economically feasible to use, place a demand of 52-foot bottom width when close abreast. The waterway in its present or improved condition (under the existing project dimensions) does not furnish sufficient width for easy passage of two tows.

53. Difficulties in passing are so severe, particularly in Dupre Cutoff and Bayou Dupont, that a barge tow will, if possible, allow any approaching tow to clear the waterway prior to entering. When circumstances make a meeting of tows imperative, it is usually necessary to ground the smaller tow on one side of the waterway and permit the other vessel to drag its tow through. In some instances, the towing vessels must render mutual assistance to complete a passage.

54. Ample surface width is available in Bayou Cutler, however, a controlling depth of 5 feet limits the efficient use of the waterway and denies access to the more modern, economical equipment.

55. Barataria Bay presents no problem as far as widths are concerned, however, it does impose a limiting maximum draft of about 4.5 feet (the controlling depth). Such movement through Barataria Bay must be by vessels drawing 4.5 feet or less to avoid actual dragging of bottom in the project channel. In the movement of crude oil and other materials by barge such dragging is impossible to avoid, because to do so would reduce the payload to an extent where profitable opera-

tion could be carried on only at excessively high costs. Even though barges are loaded to 4.5 feet in the winter months, and to 5 feet in the summer, numerous groundings are experienced on normal and low tides, and excessive delay and high operational costs are incurred.

56. Movement of crude oil from the producing fields which must utilize the waterway is exceptionally costly, as is the movement of supplies needed for the exploration for oil and the development of existing fields, and all on account of the light loads which must be carried.

57. Since Bayou Rigaud has been improved for navigation by oil interests for 2.2 miles, no difficulty is experienced by vessels of 10-foot draft in the first 0.6 mile, and none by vessels of 8-foot draft for the next 1.6 miles. The unimproved reach prevents navigation by boats of draft exceeding 3.5 feet, and makes the use of the bayou by local and itinerant vessels impossible. The shallow depths prevent the United States Coast Guard from basing and servicing their vessels near their land base with a consequent loss of efficiency. The short reach of water in Bayou Rigaud with adequate depth does not allow its full use to support operations over the Barataria Bay Waterway.

58. *Waterpower and other special subjects.*—Waterpower is not involved in the plan of improvement.

59. The United States Fish and Wildlife Service in their brief (appendix D) state that the proposed improvement would be detrimental in some respects to fish and wildlife. They suggest as a means to mitigate the results of the improvement thereon that dikes be placed along the fresh and brackish marsh area along the waterway, and that spoil disposal be handled to insure minimum damage to oyster beds and wildlife in the area.

60. The only area of fresh and brackish marsh is that area north of mile 20.8 (along Dupre Cutoff) and spoil could be placed so as to form dikes along this stretch of the waterway at the time of dredging. The provision of outlet structures in the dikes to prevent ponding in the area behind the dikes is considered unnecessary because of the low character of the marsh area and because of drainage outlets provided by other natural waterways in the area.

61. The Louisiana Wild Life and Fisheries Commission in their brief (appendix E) state that numerous oyster beds in the route of the project will be destroyed.

62. All oyster beds in the area are planted beds which are on the bottoms of natural waterways over which navigation has the paramount right. However, selection of the route can be made with the view to avoiding as many beds as possible. Inasmuch as these are planted beds those in the direct route can be transplanted to other locations.

63. Performance of the work by bucket dredge rather than by hydraulic dredge will allow placement of spoil where it will have least detrimental results. The use of bucket dredges will also result in less turbidity during the construction period than would the use of suction dredges, and will prevent the blanketing of the nearby area with a layer of silt as would probably result from the use of hydraulic dredges.

64. It is believed that desires of property owners, the State wildlife agency, and Federal Wildlife Service as to the manner of spoil disposal can be determined prior to construction of the waterway and

that spoil disposal can be handled to satisfy substantially the wishes of those concerned.

65. *Plan of improvement.*—The proposed plan of improvement is to provide a channel from the Intracoastal Waterway (mile 36.4) following the route of the existing project to mile 15.5 in Bayou St. Denis with a depth of 12 feet below mean low sea level over a 125-foot bottom width. Below mile 15.5 it is proposed to dredge a new channel of the same dimensions through the chain of islands along the west side of Barataria Bay (see pl. No. 2) intercepting the existing channel at a point about 0.6 mile northwest of Barataria Bay Light-house. From this point the existing channel will be followed to Barataria Pass and then the channel which was dredged by private interests will be used to the 12-foot contour in the Gulf of Mexico.

66. A channel of the same dimensions (12 by 125 feet) is also proposed from Barataria Pass to extend westward to Bayou Rigaud and in that bayou along the north shore of Grand Isle to vicinity of the United States Coast Guard dock, a distance of about 3.2 miles in Bayou Rigaud.

67. The depth of 12 feet and bottom width of 125 feet was considered necessary to commercial navigation on the waterway because of the following reasons:

(a) Water surfaces during winter months are depressed considerably by strong northerly winds.

(b) These channel dimensions will allow the use of modern, economical towing equipment.

(c) Movement of gasoline and crude oil from those fields along the waterway would be in barges with 8.5-foot drafts.

(d) The newer and larger shrimping vessels for the offshore shrimp fishery draw up to 8 feet of water and could not operate freely on a lesser depth.

(e) Equipment for use in the offshore development in the Gulf of Mexico are of deep draft (9 to 10 feet) and could not utilize the improvement to full advantage if it were constructed to lesser dimensions.

(f) A lesser depth and width would not allow the economical transportation of oilfield supplies to operating bases which are being established on Grand Isle for the servicing of offshore oil operations.

(g) Extension of the project to include Bayou Rigaud is a necessary adjunct to the Barataria Bay Waterway in order that full utilization of the waterway can be realized. Bayou Rigaud is now the site of shrimp-processing plants, oil company operational sites, marine ways, and supply centers for marine craft. The assured provision of adequate depths in Bayou Rigaud is necessary for the continued commercial use of the waterway. Sites along the Bayou are being rapidly developed as supply bases for offshore operations in the Gulf of Mexico, and it is the site of United States Coast Guard operations in the area. A secondary and minor benefit of improving Bayou Rigaud would be for its value as a harbor of refuge.

68. That part of the existing project which traverses the open waters of Barataria Bay has been relocated so as to pass through the chain of islands along the west side of Barataria Bay. Relocation of this portion of the channel to provide as much protection as possible from wave action is based on previous experience with channels through open, shallow bays and lakes. Maintenance costs on such open unprotected

channels have shown that such locations should be avoided where possible, in the interest of economy.

69. No bridge alterations are involved in the proposed plan of improvement. However, it will be necessary to lower 67 pipelines and 2 submarine cables which cross the proposed waterway. One pipeline crossing Bayou Rigaud at about mile 1.0 will have to be lowered, and pipelines crossing the proposed waterway at miles 0.8, 3.8, and 12.4 will have to be lowered. In addition to these 4 pipeline crossings there are 63 gathering lines across Dupre Cutoff which will have to be lowered. All 63 of these pipelines are laid practically adjacent to each other centered at about mile 23.2 of the proposed waterway. The 2 submarine cables are located in the area occupied by the 63 pipelines across Dupre Cutoff.

70. Alternative plans of improvement are not presented, as none were found to be as feasible as the one considered.

71. All rights-of-way and spoil disposal areas will be located in wooded or marshland.

72. Overdepth dredging to the extent of 2 feet is included in the estimate of cost.

73. *Shoreline changes.*—Since the dredging of the 12 by 200-foot channel from Barataria Pass to the 12-foot contour in the Gulf of Mexico no shoreline changes are evident.

74. It does not appear, therefore, that the incorporation of this channel into the proposed project will result in shoreline changes.

75. *Aids to navigation.*—The United States Coast Guard, 8th District, has been consulted with reference to aids to navigation and that office concurs in the location recommended for the channel. Costs of such additional navigational aids as may be required are shown under Estimates of First Cost and Annual Charges. A copy of letter dated May 22, 1950, and supplemental letter dated March 1, 1956, from the Commander, Eighth Coast Guard District, are attached as appendix C.

76. *Estimates of first cost and annual charges.*—Based upon prices current at the date of this report the estimated first cost and annual charges for the proposed improvement are tabulated below. Detail computations are contained in appendix B.

Feature	Federal	Non-Federal	Total
Initial construction:			
Dredging ¹	\$1,647,000		\$1,647,000
Rights-of-way and spoil disposal areas ¹		\$102,000	102,000
Navigation aids ¹	50,000		50,000
Readjustment of pipelines and submarine cables ¹		140,000	140,000
Total.....	1,697,000	242,000	1,939,000
Annual carrying charges:			
Interest.....	42,500	6,000	48,500
Amortization.....	17,500	3,000	20,500
Maintenance.....	80,000		80,000
Maintenance of navigation aids.....	4,000		4,000
Total.....	144,000	9,000	153,000

¹ Above estimates of first cost include contingencies, engineering, inspection, and overhead.

77. *Estimates of benefits.*—A deeper channel over the Barataria Bay waterway will result in a more economical method of operation for the floating equipment now in use in the oil industry.

78. Barge tows of crude oil must be kept to drafts not exceeding 5 feet, which does not allow the utilization of the full cargo space available. This in turn is reflected in the high cost of operation for moving any quantity of material. Delays are incurred when tows must pass each other in these shallow, narrow reaches.

79. In addition to elimination of loss of time in actually traversing the waterway, the proposed improvement will allow the maximum loading of cargo barges now being used, which in turn will reduce the number of trips necessary to transport the same amount of tonnage. Reduction in trips necessary will reduce the number of towing hours required and result in reduced transportation costs. The savings in transportation costs to crude oil now being moved over the waterway would amount to \$44,000 annually.

80. It is believed the fields now producing crude oil transported over the waterway (Lake Washington, Manila Village, Lake Hermitage, and Queen Bess Island) will achieve production much greater than at the present. Reduction in towing costs on potential oil movements is estimated at about \$122,000 annually.

81. Crude oil from the Lafitte Field moves by pipeline to Marrero, La., on the Mississippi River. Only the gasoline which is produced in this field is being moved over the waterway. Reduction in towing costs on the gasoline produced is estimated at \$5,000 annually.

82. The providing of a deeper and wider channel in this waterway will prove the greatest boon to the drilling of oil wells in the area. In order to drill an oil well it is necessary to transport drilling pipe, casing, mud, cement, food, potable water, fresh water, and miscellaneous tonnage to the site selected. Transportation of this material is made expensive because of the shallow drafts to which barges must be loaded. In addition to the tonnage moved for each well it is also necessary to move drilling barges and dredges to drilling sites. Movement of these larger pieces of floating equipment are more severely handicapped by the narrow bottom widths and shallow water than the cargo barges. In the case of cargo barges the drafts can be controlled by light loads, whereas the drafts of the drilling barges and dredges are fixed by the machinery permanently mounted on them. The time saved in transporting these supplies and drilling equipment into the area amounts to approximately \$231,000 annually. Drilling in this area will increase through the coming years and the prospective savings in moving additional supplies and equipment are estimated at \$38,000 annually.

83. The Oil and Gas Journal of May 9, 1955, carried an article by Norman S. Morrissey titled "Future Looks Good in South Louisiana—Nation's Most Promising Area." Extracts from that article are quoted below:

South Louisiana is quietly stealing the exploration spotlight.

This oil province, already the Nation's No. 1 exploratory area, promises to become even more important in the next few years.

There are several factors which point to a continued high rate of activity:

* * * Nearly 100 seismic crews * * * one-fifth of the Nation's total * * * are combing the swamps and marshes for prospects to be drilled.

* * * The area still is in the structural phase of exploration. Stratigraphic traps, where some experts expect half of any area's oil to be found, are yet to be sought actively.

* * * Prolific sands and high allowables more than offset the high drilling and exploration costs.

* * * Large independent companies, prohibited by high costs from entering the play earlier, are eyeing the area and are expected gradually to move in, further increasing the amount of exploratory activity.

* * * The success ratio is high. Out of 102 exploratory wells of all kinds drilled during the first 3 months this year, exactly half were successful. This 50 percent success record compares with a 1954 national average of 17.8 percent.

The aggressive search for oil is nothing new for south Louisiana. Intensive geophysical work has been carried on for the past 25 years. But better equipment and advanced interpretation are constantly finding new fields.

Reserves * * * South Louisiana is generally credited with known reserves of 2.5 billion barrels.

Many geologists expect strat traps yet to be found to provide an equal amount, giving the area a conservative claim to 5 billion barrels of recoverable reserves.

Prolific Miocene sands are the primary objective in south Louisiana. Ultimate recoveries of 50,000 barrels per acre is not uncommon. A well can easily gross over 2 million barrels of oil. Most fields have an active water drive which insures a long life and a high recovery.

The Second National Bank of Houston recently made an engineering and production study of south Louisiana fields. It concluded that the Miocene fields contain an adjusted grand total of about 32 million acre-feet of pay. In these porous and permeable sands, engineers figure reserves at between 800 and 1,000 barrels per acre-foot. But even using a very conservative figure of 250 barrels per acre-foot, a total production of 8 billion barrels from known fields is indicated. New discoveries could easily double this figure.

Costly but promising * * *. Rich reserves and high allowables are attractive to the oil companies in the play, and they tend to offset the high costs of wildcatting and development.

Under favorable conditions, a 10,500-foot field well can net more than \$10,000 a month. This means the well will pay for itself in less than 2 years.

By contrast, Oklahoma operators are faced with payouts of 5 and 6 years on deep wells. The 10,500-foot Louisiana well has an allowance of 161 barrels per day while its counterpart in Oklahoma is held to less than 100 barrels.

Although drilling on the Gulf coast is hazardous, oil companies are steadily improving their techniques and cutting down on blowouts and fishing jobs. At Weeks Island, for example, Shell Oil Co. has drilled several 17,000-foot tests in less than 90 days.

One or two dry tests, however, do not condemn a south Louisiana prospect. A major company drilled 19 dry holes on Cote Blanche, a known salt dome, before hitting on the 20th. At Avery Island, an oil trap with more than 50 million barrels of reserves lay between two dry holes less than one-half mile apart.

What to expect * * *. Operators plan to drill about 450 exploratory tests during 1955, or about 90 more than were drilled in 1954. In the swamp country most of the drilling is from barges, and a few barge rigs, if any, are idle.

Offshore drilling is on the upswing also. There are now 40 rigs running and by January 1, 1956, it is expected there will be more than 100 active locations.

84. Within that part of the gulf offshore area directly served by the Barataria Bay Waterway are more than 85 blocks of 5,000 acres each (a total of 425,000 acres), all of which are potential oil reserves. A maximum of 100 wells could be drilled on each block, or a total of 8,500 wells, an average of 170 wells a year for the next 50 years. The marsh area adjacent to the waterway holds other potential oil reserves which will in time be tapped, and thus add to the potential number of wells to be drilled annually. Savings on the movement of supplies and equipment are based on the drilling of only 33 wells annually.

85. Discovery of a sulfur deposit in the Gulf of Mexico offshore from the southern terminus of the Barataria Bay Waterway makes the movement of sulfur over the proposed waterway a certainty as lease requirements make production mandatory. It is anticipated that the potential savings on the movement of sulfur will amount to \$130,000 annually. Detailed computations of benefits are contained in appendix A.

86. An extensive shrimping industry based at Barataria, Lafitte, Manila Village, Grand Isle, Harvey, and Westwego is supported by the waters of Barataria Bay, its connecting lakes and bays, and the Gulf of Mexico at the southern terminus of the waterway. While the improved waterway will prove an incentive for the development of additional shrimp facilities along the waterway, the most apparent benefit to the shrimping boat operators will be in the saving of running time over the existing waterway. Based on the present vessels using the waterway a saving in operation costs will amount to approximately \$26,000 annually.

87. The waterway in an improved condition will result in an increased number of larger shrimping vessels which are needed to withstand open water fishing in the Gulf of Mexico. The saving on the increased number of larger shrimping vessels is estimated at \$9,000 annually.

88. Barataria Bay and connecting waterways contain a total of about 4,000 acres of cultivated oysterbeds. The principal savings to the oyster fishery will result from a saving of transit time through Bayou Dupont, Dupre Cutoff, and Bayou Cutler. The saving in time is estimated at approximately \$5,000 annually.

89. It is probable that the improvement of the waterway will result in an increase in the acreage of oysterbeds under cultivation, which in turn will increase the savings to the oyster fishery. Such increase, however, is particularly difficult to evaluate and no estimate has been attempted.

90. This waterway improvement will be of great value in providing access to other waterways connecting with supply centers. In addition it will fill the request by the United States Coast Guard for improvement of Bayou Rigaud to allow construction of boat facilities at their site on the bayou. A statement of the desirability of this extension as concerns the Coast Guard is contained in appendix C. The proposed dredging in Bayou Rigaud will open additional sites for wharves and industries.

91. Dredging in Bayou Rigaud to the point proposed, which is the site selected by the United States Coast Guard for their boat and dock facilities, will render the operation of that department more efficient as well as provide better storage and handling facilities for their vessels.

92. It will also serve to a small extent as a harbor of refuge. While conditions make impracticable a firm monetary evaluation of the benefits of a harbor of refuge, it is judged that such benefits would approximate \$5,000 annually.

93. The present Barataria Bay Waterway (5 by 50-foot project) was completed in 1925, and the latest approved annual maintenance is \$5,000. Based on an additional 20-year life, the future maintenance will amount to \$100,000. When this maintenance is allotted to the proposed improvement having a life of 50 years, it will amount to \$2,000 annually.

94. The savings to be derived from all operations on account of an improved waterway are as follows:

Source of savings	Present savings	Potential savings	Total
Crude oil.....	\$44,000	\$122,000	\$166,000
Gasoline.....	5,000	-----	5,000
Supplies and equipment.....	231,000	38,000	269,000
Sulfur.....	-----	130,000	130,000
Shrimp.....	26,000	9,000	35,000
Oysters.....	5,000	-----	5,000
Harbor of refuge.....	5,000	-----	5,000
Maintenance on existing project.....	2,000	-----	2,000
Total.....	318,000	299,000	617,000

95. Details of the computation of these benefits are contained in appendix A.

96. As a national defense measure the proposed channel would prove an added impetus toward development of the Nation's oil resources in the Gulf of Mexico. It would also provide the means of getting oil and equipment to inland waters in the shortest possible time with the least travel through waters capable of supporting enemy vessels.

97. The survey report on Bayou Lafourche, La., and the Lafourche-Jump Waterway, La., now being prepared, will consider a 12 by 125-foot waterway to extend from Bayou Lafourche at Leeville, La., to the Mississippi River at the Jump (Venice, La.).

98. The benefits shown would accrue solely from the construction of the Barataria Bay Waterway itself. The construction of the Lafourche-Jump Waterway would materially increase the benefits to the Barataria Bay Waterway, and are covered in the survey report on Bayou Lafourche, La., and the Lafourche-Jump Waterway, La.

99. *Comparison of benefits and costs.*—The ratio of estimated annual benefits to estimated annual costs is 4.0 to 1 for the Barataria Bay Waterway.

100. *Proposed local cooperation.*—It is proposed that the following local cooperation be prescribed:

(a) Provide without cost to the United States all lands, easements, and rights-of-way necessary for the relocation, enlargement, and extension of the project and for subsequent maintenance when and as required.

(b) Accomplish and maintain without cost to the United States all alterations in pipelines, cables, and any other facilities, necessary for the construction of the project.

(c) Hold and save the United States free from damages resulting from construction and maintenance of the project.

101. *Allocation of costs.*—Allocation between Federal and non-Federal agencies is set forth in paragraph 76, "Estimates of first cost and annual charges."

102. *Coordination with other agencies.*—The extent of consultation with State and Federal agencies and local organizations is indicated under "Scope of survey."

103. The official views of the United States Department of the Interior, Fish and Wildlife Service, are contained in appendix D, and

are discussed in paragraph entitled "Water Power and Other Special Subjects."

104. The Louisiana Department of Public Works sponsored the improvement at the public hearing held by the New Orleans District in Westwego on August 2, 1949, and is in favor of the project. The official views of the Louisiana Department of Wild Life and Fisheries are included as appendix E. The police jury of Jefferson Parish in a resolution dated August 10, 1955, agreed to fulfill all terms of local cooperation.

105. *Discussion.*—The existing Barataria Bay Waterway is used extensively by oil companies in transporting supplies and equipment for use in drilling operations conducted in the area, for the towing of crude petroleum and gasoline to refineries or tanker terminals, for the transportation of shrimp and oysters, and as an alternate route for pleasure boats in reaching the deep-sea-fishing area in the Gulf of Mexico. The project dimensions (5 by 50 feet) of this waterway can no longer accommodate the marine traffic negotiating the route without working severe handicaps by limiting the tonnage of tows, and eliminating the use of economical equipment. In addition delay is caused in transiting the waterway on account of drag (actual bottom drag and water drag caused by limited cross-sectional area of the waterway) and also when single vessels pass tows or two tows find it necessary to pass each other in narrow sections of the waterway.

106. Benefits from oil operations are expected to continue over the life of the project at a rate equal or greater than those claimed. Oil production from the inshore area in this vicinity is comparatively recent, with the earliest field being discovered in 1931. The earliest offshore production was in 1948. Oil companies are presently leasing sites for a period of 50 years with option of renewal. The 6 oldest south Louisiana oilfields with ages of 45 to 53 years show drilling rates in the last year greater than those claimed. The vast area of offshore acreage which is being developed and which will continue to be developed is greater than the inland area tributary to the proposed waterway. Sales of mineral leases in this offshore area have been at record prices. Conservation measures are extending the life of oilfields and improved drilling and exploratory techniques are continually extending the producing horizons of existing fields.

107. A conservative estimate of the sulfur deposit in the Gulf of Mexico near the Barataria Bay Waterway indicates a life of nearly 60 years, based on the annual production on which benefits were computed.

108. The existing project utilizes the open waters of Barataria Bay from Bayou St. Denis to Barataria Pass. Experience of the New Orleans district has been that channels dredged through the broad shallow bays and lakes in the alluvial deposits that form the gulf coast deteriorated rapidly. Maintenance of such channels by dredging alone is very expensive under ordinary conditions of wave and tidal action. Barataria Bay experiences storms of gale intensity at frequent intervals. Wave action in the shallow bays becomes intense under winds of such force and greatly disturbs the fine sand or alluvium on the bottom. For these reasons the project waterway has been relocated to the western edge of Barataria Bay to eliminate the long open water route through Barataria Bay. While this relocation has the tendency of increasing the original cost of the project, it will

decrease the future maintenance of the proposed modification and through the period of its life prove the more economical.

109. It is not believed that current velocities through the channels between the islands will prove to be a serious factor in channel maintenance of the relocated waterway.

110. The portion of the waterway from Barataria Pass to the 12-foot contour in the Gulf of Mexico follows the alinement of the existing channel dredged by the Humble Oil & Refining Co. Two storms of hurricane force have occurred in this locality since this channel was completed, once in 1948 and once in 1949. The hurricane of 1948 caused shoaling of the offshore channel for a distance of 2,800 feet to a depth of 9 feet. The channel was redredged and the storm of 1949 caused no shoaling. These storms were of sufficient intensity to furnish some indications as to what the results might be on a channel that extends into the Gulf of Mexico, at this location, which was not protected by jetties. Wave heights in the open gulf during the peaks of these storms were 27 and 25 feet. The cost of redredging the channel after the 1948 storm was \$35,000. The channel was redredged in August 1954, when it had shoaled to a depth of 10 feet.

111. Any channel dimensions less than those proposed would not adequately accommodate the types of vessels necessary for the proper conduct of offshore and inshore drilling operations and movement of crude petroleum.

112. The total first cost of the project is \$1,939,000, and annual carrying charges are \$153,000, with annual benefits of \$617,000, giving a ratio of benefits to cost of 4.0 to 1.

113. It is proposed that all costs in connection with the acquisition of rights-of-way and spoil-disposal areas, and alterations of pipelines and facilities will be borne by local interests. All costs in connection with the construction and maintenance of the waterway, as well as construction and maintenance of aids to navigation will be borne by the United States.

114. The reports of the United States Fish and Wildlife Service and the Louisiana Wild Life and Fisheries Commission do not assign monetary values to the wildlife losses which they anticipate from the plan of improvement. It is believed that a postproject analysis of wildlife conditions will indicate negligible losses for the following reasons:

(a) The lower portion of Bayou Barataria is of large dimensions in its natural state. The channel proposed for improvement is less than 12 by 125 feet, commencing in the vicinity of Dupre Cutoff and extending to the deep water in Bayou St. Denis. Increasing the dimensions of the waterway from its present project dimensions of 5 by 50 feet to project dimensions of 12 by 125 feet will have no measurable influence on the runoff characteristics of the adjacent marshes between Bayou Barataria and Bayou St. Denis. The existing natural and artificial channels interconnected through this area with Barataria Bay presently afford ample drainage opportunity, and the increased drainage caused by the improved channel will be negligible.

(b) In order to confine spoil as much as possible it is planned to do the inside dredging by bucket dredge, using hydraulic dredge only on the offshore section.

(c) It is estimated that the project will not cause any measurable change in salinity since the existing interconnected artificial and natural waterways provide free access for salt water intrusion from the

gulf under the action of tides. Data on salinities along the proposed waterway, upon which to base a firm estimate of the amount of salt water intrusion to be expected as a result of the improvement, are not now available. Limited data on salinities in adjacent waterways, fed by Barataria Bay indicate that substantial salinity intrusion takes place now under normal conditions. It is, accordingly, concluded that average salinity concentrations throughout the length of Dupre Cutoff will not significantly exceed those presently existing, nor will salinities in the Gulf Intracoastal Waterway significantly exceed those presently existing. Therefore, no monetary wildlife losses have been subtracted from the computed annual benefits.

115. *Conclusion.*—The most suitable plan of improvement for the Barataria Waterway is to provide a channel from the Intracoastal Waterway (mile 36.4) following the route of the existing project to mile 15.5 in Bayou St. Denis with a depth of 12 feet below mean low sea level over a 125-foot bottom width. Below mile 15.5 it is proposed to dredge a new channel of the same dimensions through the chain of islands along the west side of Barataria Bay (see pl. No. 2) intercepting the existing channel at a point about 0.6 mile northwest of Barataria Bay Lighthouse, the extension of the project to the 12-foot contour in the Gulf of Mexico, and also dredging in Bayou Rigaud a distance of 3.2 miles from its mouth at Bayou Fifi. This plan meets the desires of local interests and provides the smallest annual cost of maintenance.

116. There is one steel highway swing bridge crossing the waterway, on which no alterations will be required.

117. Sixty-seven pipelines cross the waterway. Most of these pipeline crossings are under Dupre Cutoff at the Texas Co.'s Lafitte oilfield. Sixty-three of these pipelines cross Dupre Cutoff within a very short distance. Consequently, costs of lowering the lines, which are to be borne by the local interests, will not be as great as if the lines were at scattered locations.

118. Funds representing the complete Federal first cost (\$1,697,000) should be provided in 1 lump sum for completion of the project in 1 working season. Funds should thereafter be provided at the rate of \$80,000 annually for maintenance when and as required.

119. *Recommendation.*—It is recommended that the project for the Barataria Bay Waterway be modified to provide a channel 12 feet in depth below mean low gulf level over a bottom width of 125 feet from its beginning at the Intracoastal Waterway to Grand Isle, La., following the present route to Bayou St. Denis, thence by a relocated channel along the western shore of Barataria Bay and through Barataria Pass, to the 12-foot depth contour in the Gulf of Mexico, with an extension of the project to include the westerly 3.2 miles of Bayou Rigaud, as shown on plate No. 2 attached; subject to such minor changes as may be approved by the Chief of Engineers at an estimated Federal first cost of \$1,647,000 exclusive of aids to navigation, and an estimated Federal annual cost of \$80,000 for maintenance; subject to the conditions that local interests—

(a) Provide without cost to the United States all lands, easements, and rights-of-way necessary for construction of the project and for subsequent maintenance when and as required.

(b) Accomplish and maintain without cost to the United States all alterations in pipelines, cables, and any other facilities, necessary for the construction of the project.

(c) Hold and save the United States free from damages resulting from construction and maintenance of the project.

WILLIAM H. LEWIS,
Colonel, Corps of Engineers,
District Engineer.

[First endorsement]

OFFICE, DIVISION ENGINEER,
LOWER MISSISSIPPI VALLEY DIVISION,
CORPS OF ENGINEERS,
Vicksburg, Miss., April 9, 1956.

Subject: Survey of Barataria Bay Waterway, La. (NOD report Mar. 16, 1956.)

To: Chief of Engineers, United States Army.

The findings and recommendation of the District Engineer are concurred in.

JOHN R. HARDIN,
Major General, United States Army,
Division Engineer.

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